Supplementary figures. Figure S1 shows how the cut-off frequency f_x of the OSGW spectrum is inferred from the acoustic noise records at the station ALOHA. Figure S2 shows examples of spectrograms observed at the monthly timescale at KIP and AIS and highlights the frequency range of interest in this study.

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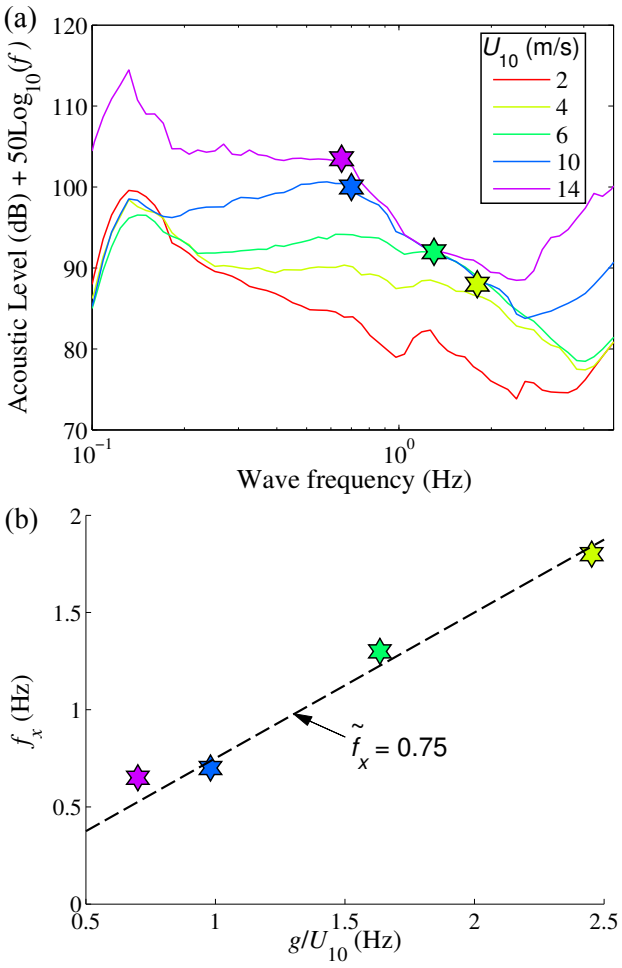

Figure S 1: (a) "Rotated" acoustic PSDs as observed at ALOHA by Duennebier et al.(2012) as a function of wave frequency $f = f_s/2$. Rotation corresponds to multiplying the raw PSDs by f^{-5}. The colored stars indicate the selected crossover frequencies at which observed PSDs transition from a f^{-5}-scaling to a f^{-7}-scaling. We interpret this transition as the transition from Kitaigorodskii's equilibrium range (Kitaigorodskii, 1983) to Phillip's saturation range (Phillips, 1958). (b) Transition frequency as a function of g/U_{10}. The dashed line corresponds to linear best fit of the form $y = ax$. Slope corresponds to the non-dimensional frequency $\tilde{f}_x = 0.75$ that we use to describe the OSGW spectrum (see equation 6 of the main text).

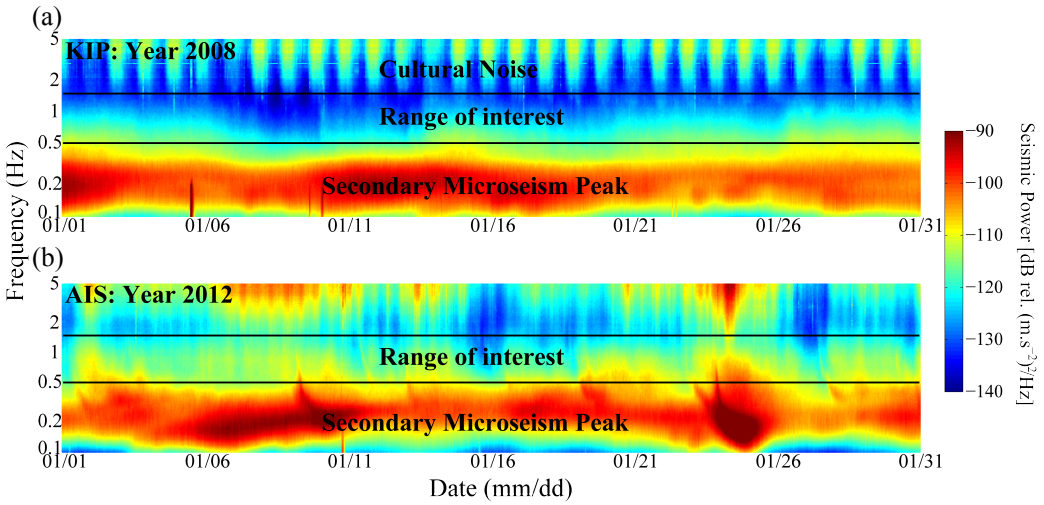

Figure S 2: Examples of spectrograms observed at the monthly timescale at (a) KIP and (b) AIS. The 0.5-1.5 frequency range is modeled in this study. Seismic power above 1.5 Hz corresponds to cultural noise at KIP and to an unidentified but wind-related source at AIS (see also figure 5 of the main text).